DOCUMENT RESUME

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ABSTRACT

As part of a series of tests to measure mastery of specific skills in the natural sciences, copies of tests 14 through 26 include: (14) calculating an average; (15) identifying parts of the scientific method; (16) reading a geological map; (17) identifying elements, mixtures and compounds; (18) using Ohm's law in calculation; (19) interpreting food chains, webs and pyramids; (20) measuring angles of incidence, reflection and refraction; (21) calculating kinetic energy; (22) using F=ma; (23) using a table of geological pyramids; (24) using scientific notation 2; (25) manipulating equations; and (26) undertaking experimental design. The multiple choice questions were written for students in grades 7 through 10. Teachers' notes and scoring information are provided for each test. (CM)

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M 14

New South Wales **Department of Education**

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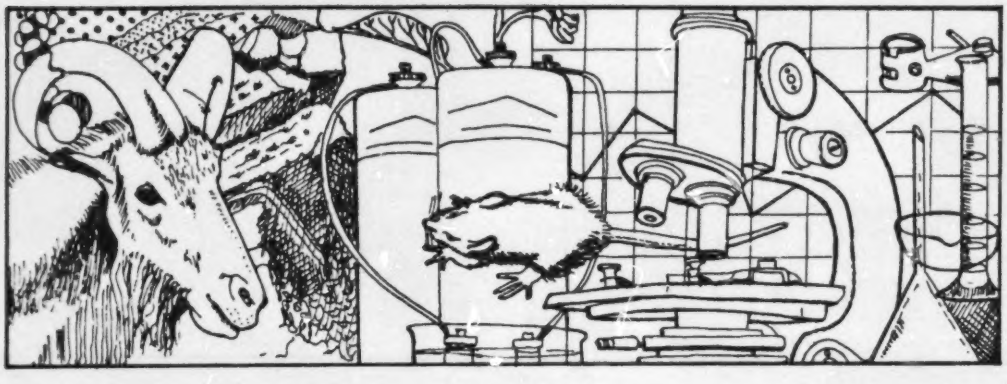
SCIENCE

MASTERY TESTING PROGRAMME



TEST M14 : A TEST FOR

THE SKILL OF

CALCULATING AN AVERAGE

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TM 820 310

This test is designed to test your ability to calculate averages.

The following questions (1 - 15) involve finding the average of five columns of numbers. You must select the correct number from the answer columns (A, B, C or D) and write them on your answer sheet.

P	Q	R	S	T
2	8	12	20	10.0
7	6	11	42	21.0
3	9	13	65	62.5
4	5	20	83	77.7
	7	15	95	31.3
		19	73	
		15		

SET 1

What is the correct sum of each of the columns listed above?

Question	Column	ANSWERS			
		A	B	C	D
1	P	13	14	16	17
2	Q	32	33	34	35
3	R	100	105	110	115
4	S	295	358	378	388
5	T	202.5	222.5	302.5	305.5

SET 2

What number should you divide into each sum to find the average?

Question	Column	ANSWERS			
		A	B	C	D
6	P	1	2	3	4
7	Q	5	6	7	8
8	R	5	6	7	8
9	S	5	6	7	8
10	T	5	6	7	8

SET 3

What is the average of each list of numbers?

Question	Column	ANSWERS			
		A	B	C	D
11	P	1	2	3	4
12	Q	6	7	8	9
13	R	12	13	15	19
14	S	63	65	73	75
15	T	40.5	42.5	52.5	55.5

SET 4

The ages for five boys and five girls in a high school class are shown below. Use these ages to answer the questions.

BOYS: 12, 12, 12, 13, 14

GIRLS: 13, 13, 14, 14, 15

QUESTIONS	ANSWERS			
	A	B	C	D
16. The average age of the boys is:	12.0	12.6	13.0	13.6
17. The average age of the girls is:	12.8	13.0	13.8	14.5
18. The average age of both the boys and the girls is:	12.0	12.2	13.2	13.3
19. How many girls have ages that are above the average for all the children?	1	2	3	4
20. How many boys have ages that are above the average for both the girls and boys?	1	2	3	4

TEACHERS' NOTES

This test is designed to determine whether or not the student can calculate averages given a set of figures.

This test has been tested on a range of students in Years 7 to 10 in New South Wales schools.

Recommended mastery score:

The final decision as to the score which indicates mastery must lie with the classroom teacher. The information below will help you to arrive at an informed decision. In this table you will find the percentages of students achieving a given score *or better*. Cumulative percentages are given for the two years in which the largest samples occur.

YEAR	NO. OF STUDENTS	S C O R E								
		≥ 20	≥ 19	≥ 18	≥ 17	≥ 16	≥ 15	≥ 14	≥ 13	<13
9	145	31%	39%	49%	60%	69%	73%	74%	79%	21%
10	268	51%	65%	75%	79%	83%	86%	87%	91%	9%

In general a student achieving a score of 16 out of 20 should be regarded as having mastered this skill.

Proper use of the scores:

This test is not designed to rank or grade students and its use for this purpose is highly undesirable. The scores obtained on this test will supply information about students who are having difficulty with the skill tested. For a more detailed analysis of these points, consult the manual which accompanies these tests.

Set scores:

Low scores on certain sets of questions may indicate specific problems as indicated below:

Set 1 Failure to add correctly.

Set 2 Lack of knowledge that an average is obtained by dividing by the total number of measurements given.

Set 3 Failure to use addition & division correctly in calculating the mean.

Set 4 Difficulties in handling more complex problems.

Related tests:

M1 Reading a table.

Related skills for which tests have not been prepared:

1. Basic mathematical skills.

M 15

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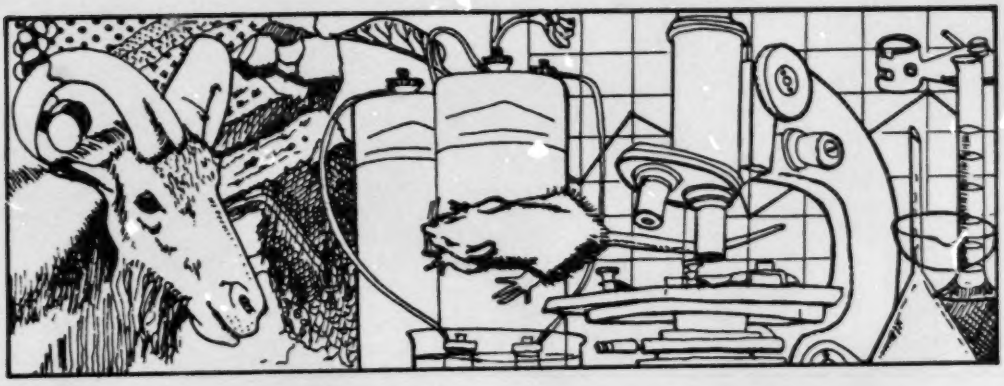

TEST M15 : A TEST FOR

THE SKILL OF

IDENTIFYING PARTS OF THE SCIENTIFIC METHOD

This test is designed to test your ability to identify parts of scientific method, and the order in which they occur.

SET 1

"A boy put a plant in the soil outside his home on a cold, sunny day. He noticed that the plant drooped after a while. The boy thought that the cold and the sunshine had made the plant droop. He tested this idea by placing another plant in soil in his refrigerator overnight. In the morning, he found that the plant had drooped. He decided that the cold and the light in the refrigerator had made the plant droop. He finally stated that cold and light do make plants droop."

The next five questions require you to identify certain parts of the passage. Choose the correct name for each sentence and write its letter (A, B, C or D) on your answer sheet.

Question	Sentence	An example of			
		A	B	C	D
1	He noticed that the plant drooped after a while.	theory	experiment	hypothesis	observation
2	He finally stated that cold and light do make plants droop.	fact	conclusion	theory	experiment
3	He decided that the cold and light in the refrigerator had made the plant droop.	result	hypothesis	conclusion	experiment
4	He tested this idea by placing another one of the plants in soil in his refrigerator overnight.	experiment	hypothesis	result	theory
5	In the morning he found that the plant had drooped.	conclusion	experiment	result	theory

SET 2

For each of the following questions, select the correct answer and write its letter (A, B, C or D) on your answer sheet.

Question	Statement	ANSWERS			
		A	B	C	D
6	Experiment comes after	conclusion	hypothesis	theory	results
7	Conclusion comes before	experiment	result	theory	observation
8	Experiment is the same as	observation	test	theory	fact
9	A hypothesis accepted often grows into a	result	fact	theory	test
10	A result is part of	theory	hypothesis	observation	experiment

TEACHERS' NOTES

This test is designed to determine whether or not the student can identify and place in correct time sequence components of the scientific method.

This test has been tested on a range of students in Years 7 to 10 in New South Wales schools.

Recommended mastery score:

The final decision as to the score which indicates mastery must lie with the classroom teacher. The information below will help you to arrive at an informed decision. In this table you will find the percentages of students achieving a given score *or better*. Cumulative percentages are given for the two years in which the largest samples occur.

YEAR	NO. OF STUDENTS	SCORE								
		≥10	≥9	≥8	≥7	≥6	≥5	≥4	≥3	<3
7	120	1%	15%	35%	59%	72%	83%	93%	97%	3%
10	316	2%	20%	40%	64%	80%	91%	96%	100%	0%

In general a student achieving a score of 8 out of 10 should be regarded as having mastered this skill.

Proper use of the scores:

This test is not designed to rank or grade students and its use for this purpose is highly undesirable. The scores obtained on this test will supply information about students who are having difficulty with the skill tested. For a more detailed analysis of these points, consult the manual which accompanies these tests.

Set scores:

Low scores on certain sets of questions may indicate specific problems as indicated below:

Set 1 Failure to identify components of "the scientific problems as indicated below:

Set 2 Failure to identify order of components.

Related tests:

M11 Naming the branches of science.

M26 Undertaking experimental design.

Related skills for which tests have not been prepared:

Generating hypotheses.

Designing experiments.

Making observations.

Drawing conclusions.

M 16

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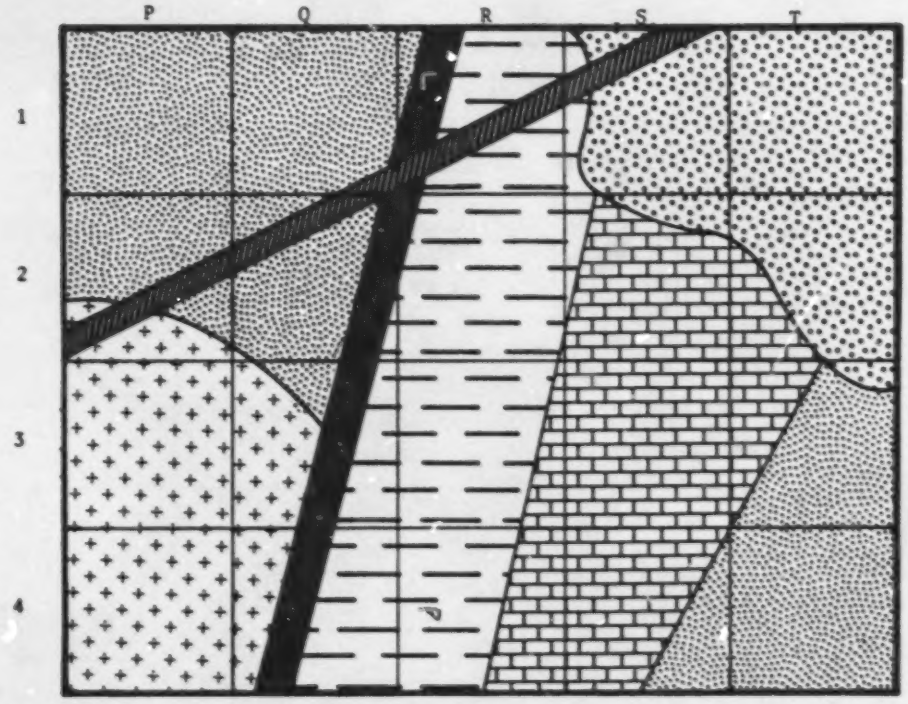
TEST M16 : A TEST FOR
THE SKILL OF
READING A GEOLOGICAL MAP

This test measures your ability to read and interpret a geological map. All of the questions refer to the map below:



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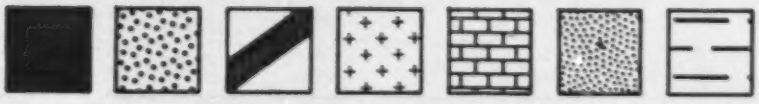

Coal | Conglomerate | Dolerite dyke | Granite | Limestone | Sandstone | Shale

In the next 5 questions, identify the rock which occurs in the named square. Find it in the list of possible answers and mark its letter (A, B, C or D) on your answer sheet.

Question	Square	Possible Answers			
		A	B	C	D
1	P_1	Coal	Conglomerate	Sandstone	Shale
2	P_3	Coal	Dolerite	Granite	Shale
3	S_3	Conglomerate	Limestone	Sandstone	Shale
4	T_1	Conglomerate	Dolerite	Limestone	Sandstone
5	T_4	Coal	Granite	Limestone	Sandstone

SET 2

In the next 5 questions, identify the *most common* rock type in the named square and marks its letter (A, B, C or D) on your answer sheet.

Question	Square	Possible Answers			
		A	B	C	D
6	Q_2	Coal	Dolerite	Sandstone	Shale
7	Q_4	Coal	Granite	Sandstone	Shale
8	R_1	Coal	Dolerite	Sandstone	Shale
9	S_2	Conglomerate	Dolerite	Granite	Limestone
10	T_2	Conglomerate	Limestone	Sandstone	Shale

SET 3

In the next 5 questions, a rock is named, and four squares are named. Choose the ONE square in which the rock occurs and mark its letter (A, B, C or D) on your answer sheet.

Question	Rock	Possible Answers			
		A	B	C	D
11	Conglomerate	P_1	Q_1	R_1	S_1
12	Shale	Q_1	R_2	S_3	T_4
13	Sandstone	Q_2	R_2	S_2	T_2
14	Coal	Q_4	R_4	S_4	T_4
15	Dolerite	S_1	S_2	S_3	S_4

TEACHERS' NOTES

This test is designed to determine whether or not the student can read a geological map.

This test has been tested on a range of students in Years 7 to 10 in New South Wales schools.

Recommended mastery score:

The final decision as to the score which indicates mastery must lie with the classroom teacher. The information below will help you to arrive at an informed decision. In this table you will find the percentages of students achieving a given score *or better*. Cumulative percentages are given for the two years in which the largest samples occur.

YEAR	NO. OF STUDENTS	SCORE								
		≥15	≥14	≥13	≥12	≥11	≥10	≥9	≥8	<8
8	99	70%	84%	93%	94%	96%	98%	98%	99%	1%
10	303	65%	90%	94%	96%	97%	99%	99%	99%	1%

In general a student achieving a score of out of should be regarded as having mastered this skill.

Proper use of the scores:

This test is not designed to rank or grade students and its use for this purpose is highly undesirable. The scores obtained on this test will supply information about students who are having difficulty with the skill tested. For a more detailed analysis of these points, consult the manual which accompanies these tests.

Set scores:

Low scores on certain sets of questions may indicate specific problems as indicated below:

All sets : Inability to use grid co-ordinates.
Inability to use key correctly.
Set 2 : Inability to estimate most common rock type in grid area.

Related tests:

021022 Reading from a grid plan.
021024 Interpreting a geological map.
021023 Reading a geological map.

Related skills for which tests have not been prepared:

Drawing a geological map.
Drawing a geological cross-section from contoured geological maps.
Identification of geological structures.

M 17

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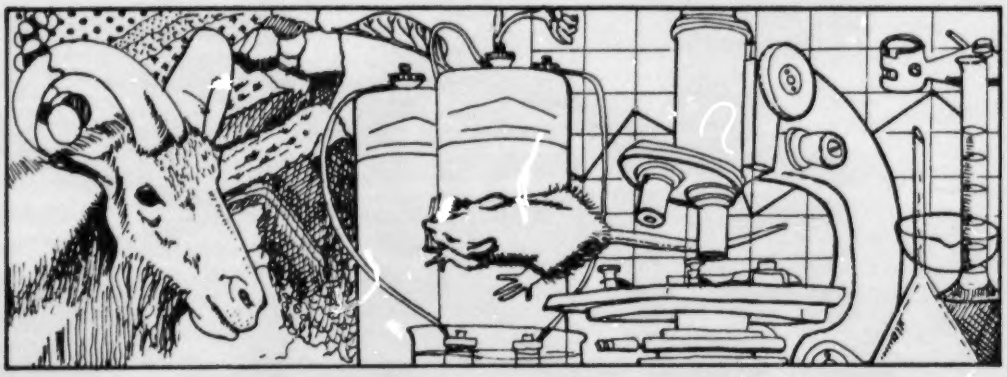

TEST M17 : A TEST FOR

THE SKILL OF

IDENTIFYING ELEMENTS, MIXTURES AND COMPOUNDS

This test is designed to test your ability to identify elements, compounds, and mixtures.

Set 1 Choose the substance which is an <u>element</u> from the alternatives in questions 1-5. Mark its letter (A,B,C or D) on your answer sheet.

QUESTION	ANSWERS			
	A	B	C	D
1	chlorine	salt	sugar	water
2	alcohol	milk	solder	tin
3	acid	iron	litmus	rust
4	air	gas	ice	oxygen
5	cotton	solder	sulphur	wool

Set 2 Choose the substance which is a <u>mixture</u> from the alternatives in questions 6-10. Mark its letter (A,B,C or D) on your answer sheet.

QUESTION	ANSWERS			
	A	B	C	D
6	air	lead	salt	water
7	water	milk	tin	zinc
8	aluminium	iron	soil	sugar
9	lead	solder	tin	zinc
10	cellulose	blood	gelatin	graphite

Set 3 Choose the substance which is a compound from the alternatives in questions 11-15. Mark its letter (A,B,C or D) on your answer sheet.

QUESTION	ANSWERS			
	A	B	C	D
11	air	lead	rust	tin
12	iron	milk	salt	sulphur
13	coffee	hydrogen	milk	sugar
14	ice	sulphur	silver	tin
15	chlorine	milk	tea	starch

Set 4 Choose the correct classification for each substance from the alternatives given in questions 16-20. Mark its letter (A,B or C) on your answer sheet.

QUESTION	SUBSTANCE	ANSWERS		
		A	B	C
16	Nitrogen	compound	element	mixture
17	Petrol	compound	element	mixture
18	Quartz	compound	element	mixture
19	Rust	compound	element	mixture
20	Saliva	compound	element	mixture

TEACHERS' NOTES

This test is designed to determine whether or not the students know the differences between elements, mixtures and compounds and can distinguish between common elements, mixtures and compounds.

This test has been tested on a range of students in Years 7 to 10 in New South Wales schools.

Recommended mastery score:

The final decision as to the score which indicates mastery must lie with the classroom teacher. The information below will help you to arrive at an informed decision. In this table you will find the percentages of students achieving a given score *or better*. Cumulative percentages are given for the two years in which the largest samples occur.

YEAR	NO. OF STUDENTS	SCORE								
		≥20	≥18	≥16	≥14	≥12	≥10	≥9	≥8	<8
9	79	4%	13%	15%	18%	32%	44%	62%	70%	30%
10	282	3%	11%	21%	34%	46%	62%	71%	78%	22%

In general a student achieving a score of 16 out of 20 should be regarded as having mastered this skill.

Proper use of the scores:

This test is not designed to rank or grade students and its use for this purpose is highly undesirable. The scores obtained on this test will supply information about students who are having difficulty with the skill tested. For a more detailed analysis of these points, consult the manual which accompanies these tests.

Set scores:

Low scores on certain sets of questions may indicate specific problems as indicated below:

Set 1 Lack of familiarity with the substances named.
Failure to understand what is meant by *element*.

Set 2 Lack of familiarity with the substances named.
Failure to understand what is meant by *mixture*.

Set 3 Lack of familiarity with the substances named.
Failure to understand what is meant by *compound*.

Set 4 Lack of familiarity with the substances named.
Failure to understand what is meant by *element*, *compound* or *mixture*.

Related skills for which tests have not been prepared:

Recognising elements, compounds and mixtures using laboratory techniques.

Isolating elements and compounds from mixtures.

M 18

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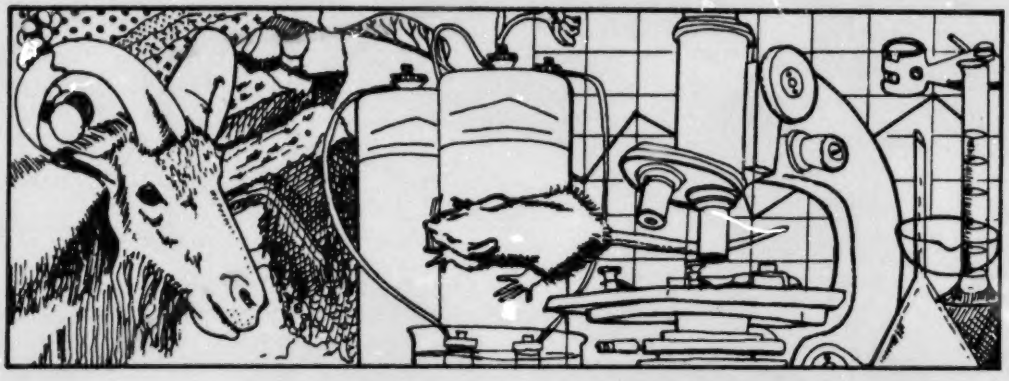

TEST M18 : A TEST FOR

THE SKILL OF

USING OHM'S LAW IN CALCULATION

This test measures your ability to carry out calculations involving Ohm's Law.

OHM'S LAW

P.D. = I x R

WHERE P.D. = POTENTIAL DIFFERENCE (IN VOLTS)

I = CURRENT (IN AMPERES)

R = RESISTANCE (IN OHMS)

For each question, choose the alternative which belongs in the gap in the table. Mark its letter (A, B, C or D) on your answer sheet.

Question	Table			A	B	C	D
	Potential Diff. (in volts)	Current (in amps)	Resistance (in ohms)				
1		0.1	0.1	0.01	0.1	1	10
2		1	0.5	0.05	0.5	1	2
3		1	2	0.5	1	2	3
4		2	5	0.4	2.5	7	10
5		5	1	0.2	5	6	10
6	10	1		0.1	1	10	11
7	10	10		1	10	20	100
8	2	5		0.4	2.5	7	10
9	100	5		0.05	0.5	20	500
10	250	25		0.1	10	275	6250
11	10		10	0	1	20	100
12	5		1	0.2	4	5	6
13	20		50	0.4	2.5	70	1000
14	100		1000	0.1	10	1100	100000
15	250		100	0.04	1	2.5	25000

SET 4

This set is designed to identify problems which you may have shown in the first three sets. In each question, use the equation given for that question to find the correct answer, and mark its letter (A, B, C or D) on your answer sheet.

Question	Given Equation	Find	ANSWERS			
			A	B	C	D
16	$x = 2y$	y	$2x$	x	$\frac{x}{2}$	x^2
17	$y = \frac{x}{z}$	x	yz	$\frac{z}{y}$	$\frac{y}{z}$	$y + z$
18	$y = \frac{x}{z}$	z	$\frac{x}{y}$	$\frac{y}{z}$	xy	$x + y$
19	$x = yz$	y	$\frac{z}{x}$	$\frac{x}{z}$	xz	$x + z$
20	$x = yz$	z	$\frac{x}{y}$	$\frac{y}{x}$	xy	$x + y$

TEACHERS' NOTES

This test is designed to determine whether or not the student can carry out calculations involving Ohm's Law.

This test has been tested on a range of students in Year 10 in New South Wales schools.

Recommended mastery score:

The final decision as to the score which indicates mastery must lie with the classroom teacher. The information below will help you to arrive at an informed decision. In this table you will find the percentages of students achieving a given score *or better*. Cumulative percentages are given for the two years in which the largest samples occur.

YEAR	NO. OF STUDENTS	SCORE								
		≥15	≥14	≥13	≥12	≥11	≥10	≥9	≥8	<8
	ONLY	YEAR	TEN	WAS	INVOLVED	IN	TRIALS			
10	364	9%	19%	26%	32%	51%	64%	77%	85%	15%

In general a student achieving a score of 12 out of 15 should be regarded as having mastered this skill.

Proper use of the scores:

This test is not designed to rank or grade students and its use for this purpose is highly undesirable. The scores obtained on this test will supply information about students who are having difficulty with the skill tested. For a more detailed analysis of these points, consult the manual which accompanies these tests.

Set scores:

Low scores on certain sets of questions may indicate specific problems as indicated below:

Set 1 Failure to substitute and multiply correctly.

Set 2 Failure to manipulate equation correctly (see 021064)
Failure to substitute and divide correctly.

Set 3 Failure to manipulate equation correctly (see 021064)
Failure to substitute and divide correctly.

Set 4 These items are intended to identify particular difficulties in equation manipulation.

Related tests:

021058 Using F = ma

021064 Manipulating equations.

Related skills for which tests have not been prepared:

Using: P.E. = mgh
K.E. = $\frac{1}{2}mv^2$
W = Fs
S = $\frac{D}{T}$
V = u + at etc.

Wiring circuits
Reading meters

M 19

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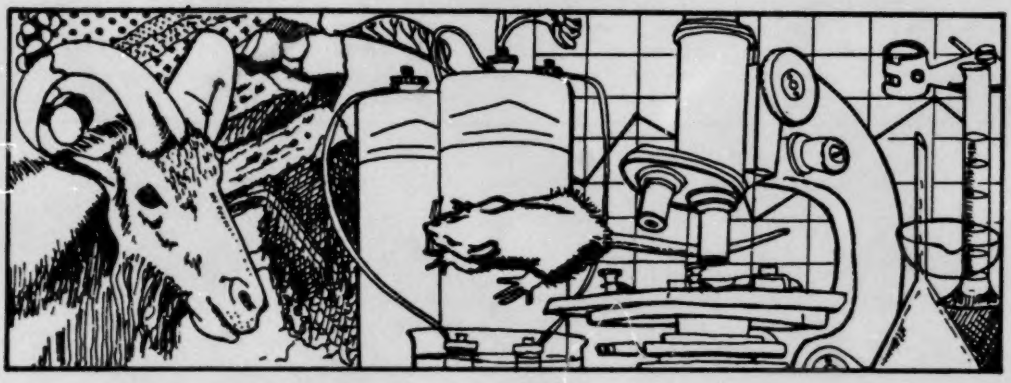


TEST M19 : A TEST FOR

THE SKILL OF

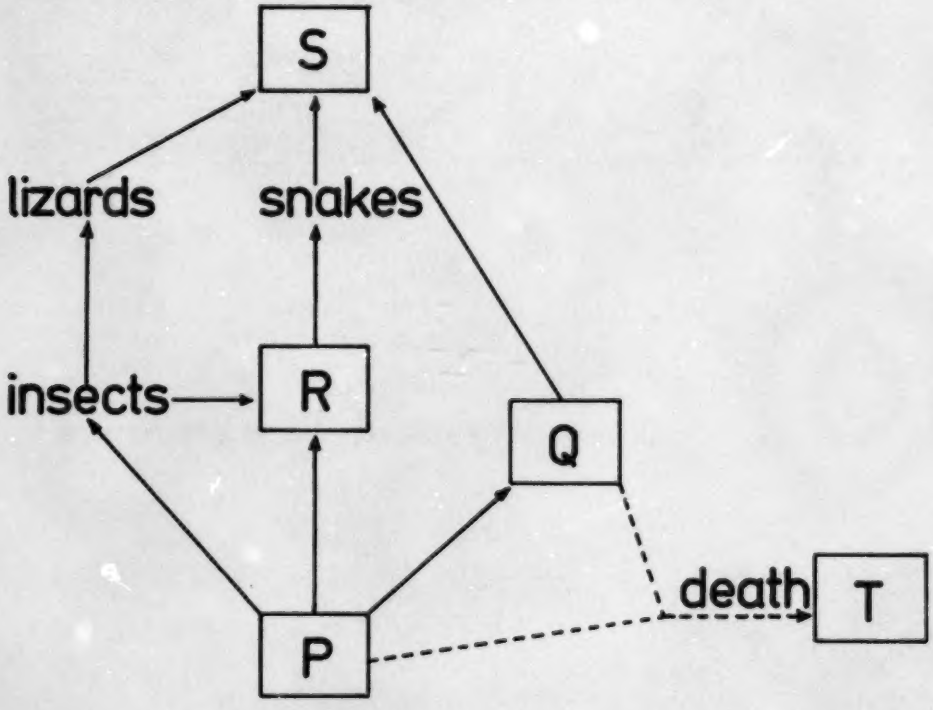
INTERPRETING FOOD CHAINS, WEBS AND PYRAMIDS

This test is designed to test your ability to interpret diagrams of food chains, food webs, and food pyramids, and to identify missing links in incomplete diagrams.

Set 1 In the next five questions, an incomplete food chain is shown. In each question, choose the alternative which best fits the gap in the food chain. Mark its letter (A,B,C or D) on your answer sheet.

QUESTION	INCOMPLETE FOOD CHAIN	ANSWERS			
		A	B	C	D
1	grass→?→snake→bird	flower	grasshopper	horse	cat
2	?→caterpillar→frog→cat	dingo	butterfly	leaf	spider
3	flower→bee→spider→?	mosquito	fern	grasshopper	bird
4	seaweed→black-fish→king-fish→?	shark	octopus	crab	lobster
5	?→water snail→gold-fish→bird	algae	worm	rock	water snake

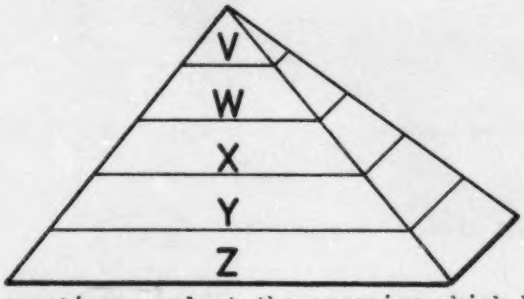
Set 2 The next five questions refer to this food web diagram.



Choose the name which fits best in the space on the diagram and mark its letter on your answer sheet.

QUESTION	LETTER ON DIAGRAM	ANSWERS			
		A	B	C	D
6	P	herbivore	scavenger	producer	carnivore
7	Q	herbivore	producer	omnivore	carnivore
8	R	producer	omnivore	carnivore	scavenger
9	S	omnivore	herbivore	carnivore	scavenger
10	T	producer	herbivore	carnivore	scavenger

Set 3 The next five questions refer to this food pyramid diagram



For each of the questions, select the organism which best fits the statement, and mark its letter (A,B,C or D) on your answer sheet.

QUESTION	QUESTIONS BASED ON DIAGRAMS	ANSWERS			
		A	B	C	D
11	The producer in the pyramid is	V	X	Y	Z
12	The herbivore in the pyramid is	V	X	Y	Z
13	The animal with the smallest number in the community is	V	W	X	Y
14	The living thing that has the largest numbers in the community is	V	W	Y	Z
15	The first carnivore is	W	X	Y	Z

TEACHERS' NOTES

This test is designed to determine whether or not the student understands the concepts involved in food chains, webs and pyramids and can correctly follow through a food chain, web and pyramid.

This test has been tested on a range of students in Years 7 to 10 in New South Wales schools.

Recommended mastery score:

The final decision as to the score which indicates mastery must lie with the classroom teacher. The information below will help you to arrive at an informed decision. In this table you will find the percentages of students achieving a given score *or better*. Cumulative percentages are given for the two years in which the largest samples occur.

YEAR	NO. OF STUDENTS	S C O R E								
		≥15	≥14	≥13	≥12	≥11	≥10	≥9	≥8	<8
8	60	20%	33%	64%	79%	85%	90%	93%	97%	3%
10	409	18%	29%	39%	50%	59%	68%	77%	84%	16%

In general a student achieving a score of 12 out of 15 should be regarded as having mastered this skill.

Proper use of the scores:

This test is not designed to rank or grade students and its use for this purpose is highly undesirable. The scores obtained on this test will supply information about students who are having difficulty with the skill tested. For a more detailed analysis of these points, consult the manual which accompanies these tests.

Set scores:

Low scores on certain sets of questions may indicate specific problems as indicated below:

Set 1 Incorrect interpretation of arrows.
Unfamiliarity with organisms used in questions.

Set 2 Unfamiliarity with conventions used in diagram.
Unfamiliarity with terms used in options.

Set 3 Unfamiliarity with conventions used in diagram.
Unfamiliarity with terms used in options.

Related skills for which tests have not been prepared:

Drawing food chain, web, and pyramid diagrams.

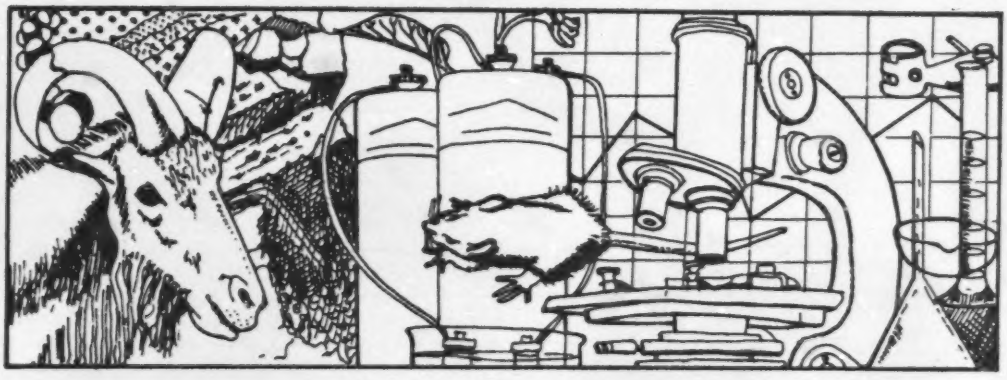
Identifying members of real food chains, webs and pyramids.

M 20

New South Wales **Department of Education**

SCIENCE

MASTERY TESTING PROGRAMME



TEST M20 : A TEST FOR

THE SKILL OF

MEASURING ANGLES OF INCIDENCE, REFLECTION AND REFRACTION

YOU WILL NEED A PROTRACTOR TO ANSWER THIS TEST.

This test is designed to measure your ability to measure angles of incidence, reflection and refraction. For each of the next fifteen questions, measure the angle asked for, and find the letter which matches the correct value. Mark the letter (A, B, C or D) on your answer sheet.

Set 1

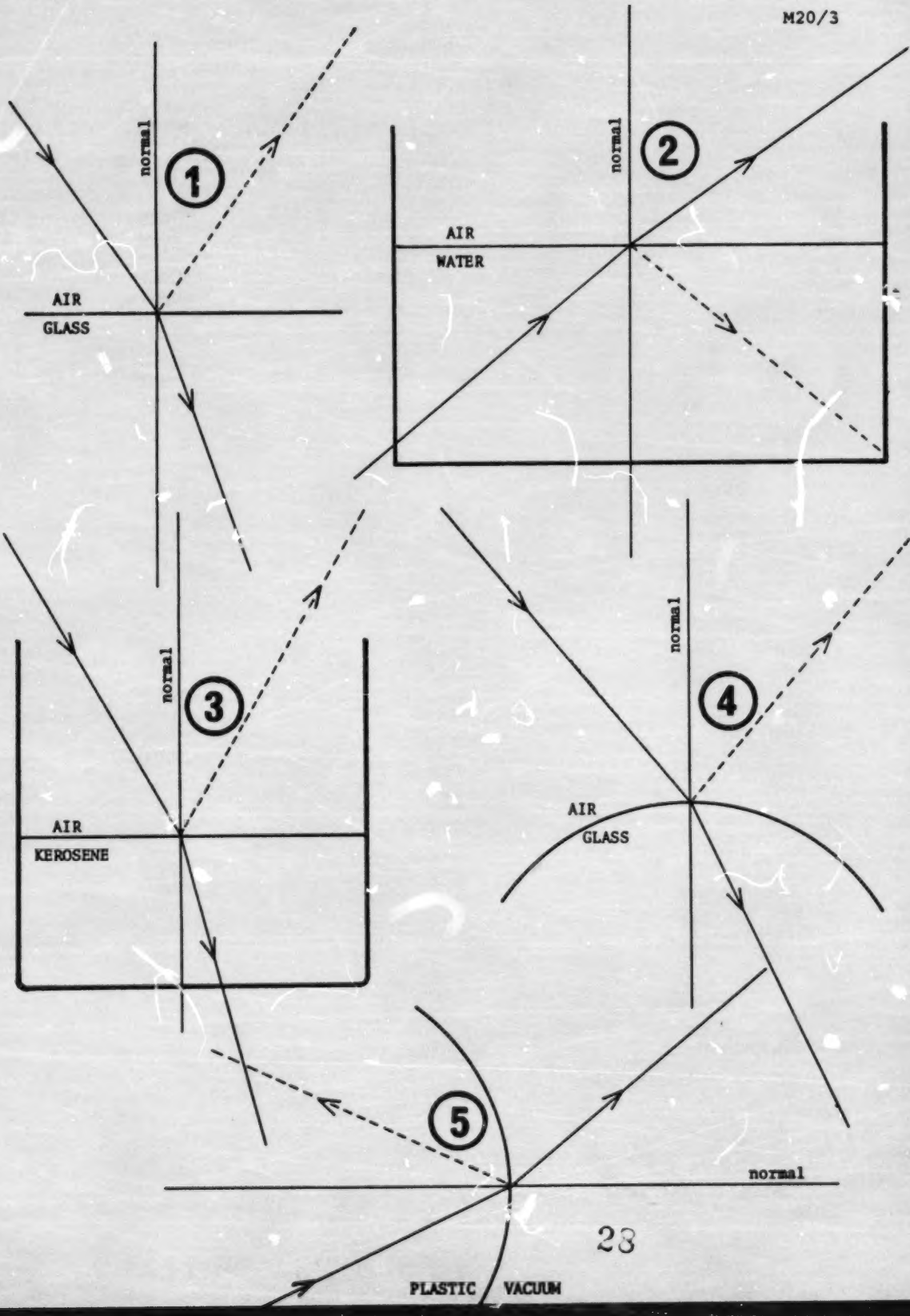
QUESTION	ANGLE INCIDENCE FOR	A	B	C	D
1	Diagram 1 is	20	35	55	70
2	Diagram 2 is	45	50	55	60
3	Diagram 3 is	24	26	28	30
4	Diagram 4 is	40	50	80	110
5	Diagram 5 is	18	20	25	50

Set 2

QUESTION	ANGLE REFLECTION FOR	A	B	C	D
6	Diagram 1 is	30	35	55	60
7	Diagram 2 is	40	45	50	55
8	Diagram 3 is	30	40	50	60
9	Diagram 4 is	30	35	40	80
10	Diagram 5 is	20	25	28	45

Set 3

QUESTION	ANGLE REFRACTION FOR	A	B	C	D
11	Diagram 1 is	20	35	65	70
12	Diagram 2 is	25	45	55	75
13	Diagram 3 is	15	75	125	132
14	Diagram 4 is	25	40	60	80
15	Diagram 5 is	20	30	35	40


normal
1
AIR
GLASS
normal
2
AIR
WATER
normal
3
AIR
KEROSENE
normal
4
AIR
GLASS
5
normal
PLASTIC
VACUUM

TEACHERS' NOTES

This test is designed to determine whether or not the student can identify and measure angles of incidences, refraction and reflection.

This test has been tested on a range of students in Years 7 to 10 in New South Wales schools.

Recommended mastery score:

The final decision as to the score which indicates mastery must lie with the classroom teacher. The information below will help you to arrive at an informed decision. In this table you will find the percentages of students achieving a given score *or better*. Cumulative percentages are given for the two years in which the largest samples occur.

YEAR	NO. OF STUDENTS	S C O R E								
		≥15	≥14	≥13	≥12	≥11	≥10	≥9	≥8	<8
9	135	15%	22%	30%	38%	47%	58%	65%	70%	30%
10	252	8%	19%	26%	35%	45%	58%	66%	77%	23%

In general a student achieving a score of 12 out of 15 should be regarded as having mastered this skill.

Proper use of the scores:

This test is not designed to rank or grade students and its use for this purpose is highly undesirable. The scores obtained on this test will supply information about students who are having difficulty with the skill tested. For a more detailed analysis of these points, consult the manual which accompanies these tests.

Set scores:

Low scores on certain sets of questions may indicate specific problems as indicated below:

Set 1 Misunderstanding of meaning of "angle of incidence". Incorrect use of protractor.

Set 2 Misunderstanding of meaning of "angle of reflection". Incorrect use of protractor.

Set 3 Misunderstanding of meaning of "angle of refraction". Incorrect use of protractor.

Related tests:

021052 Recognising angles of incidence, reflection and refraction (trial edition)

Related skills for which tests have not been prepared:

Plotting angles of incidence, reflection and refraction in real life.

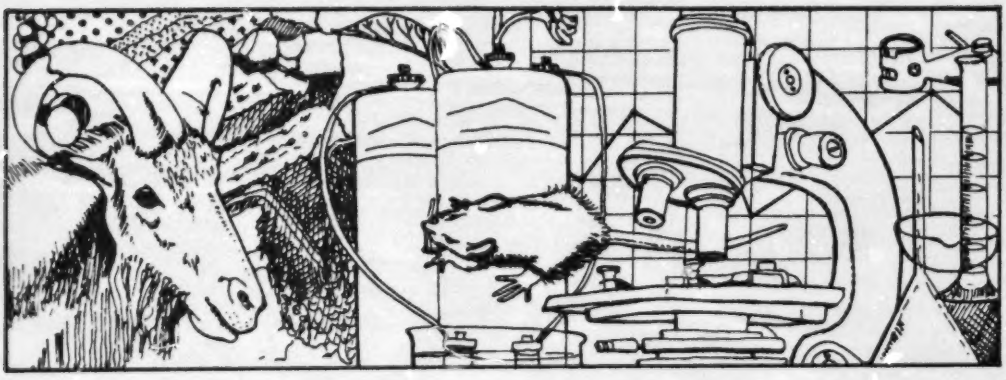
Using a protractor.

M 21

New South Wales **Department of Education**

SCIENCE

MASTERY TESTING PROGRAMME



TEST M21 : A TEST FOR

THE SKILL OF

CALCULATING KINETIC ENERGY

This test is designed to measure your ability to calculate the kinetic energy of moving bodies using the equation

$$KE = \tfrac{1}{2}MV^2$$

where KE is the kinetic energy in joules,
M is the mass in kilograms
and V is the velocity in metres per second.

SET 1

In each of the next five questions, you are given the mass and the velocity of a moving body. Choose the correct kinetic energy from the alternatives given, and mark its letter (A, B, C or D) on your answer sheet.

Question	Mass kg	Velocity m/s	KINETIC ENERGY IN JOULES			
			A	B	C	D
1	1	2	1	2	3	4
2	2	1	1	2	3	4
3	4	20	80	320	400	800
4	5	10	50	100	250	500
5	10	5	50	100	125	250

SET 2

Choose the object with the *greatest* kinetic energy from the alternatives given. Mark the letter (A, B, C or D) of your choice on your answer sheet.

Question	OBJECT A		OBJECT B		OBJECT C		OBJECT D	
	Mass	Vel.	Mass	Vel.	Mass	Vel.	Mass	Vel.
6	1	5	2	3	4	2	5	1
7	1	4	2	3	4	2	5	1
8	1	3	3	1	2	2	2	3
9	10	20	20	10	50	5	5	30
10	10	1	2	5	1	10	5	2

SET 3

In each of the next ten questions, changes to a moving body are named. Work out what the change will be to the kinetic energy. Find the letter (A, B, C or D) which matches your answer and mark it on your answer sheet.

Question	CHANGE(S)	A	B	C	D
11	mass is halved	$\times\frac{1}{2}$	×2	$\times\frac{1}{4}$	×4
12	mass is doubled	$\times\frac{1}{2}$	×2	$\times\frac{1}{4}$	×4
13	velocity is halved	$\times\frac{1}{2}$	×2	$\times\frac{1}{4}$	×4
14	velocity is doubled	$\times\frac{1}{2}$	×2	$\times\frac{1}{4}$	×4
15	mass and velocity halved	$\times\frac{1}{2}$	$\times\frac{1}{4}$	×1/8	×1/16
16	mass and velocity doubled	×2	×4	×6	×8
17	mass halved and velocity doubled	$\times\frac{1}{2}$	×1	×2	×4
18	mass doubled and velocity halved	$\times\frac{1}{2}$	×1	×2	×4
19	mass tripled	×1/3	×3	×6	×9
20	velocity tripled	×1/9	×1/3	×6	×9

TEACHERS' NOTES

This test is designed to determine whether or not the student can calculate kinetic energy using the equation $KE = \frac{1}{2}MV^2$

This test has been tested on a range of students in Years 10 New South Wales schools.

Recommended mastery score:

The final decision as to the score which indicates mastery must lie with the classroom teacher. The information below will help you to arrive at an informed decision. In this table you will find the percentages of students achieving a given score *or better*. Cumulative percentages are given for the two years in which the largest samples occur.

YEAR	NO. OF STUDENTS	SCORE								
		≥ 20	≥ 18	≥ 16	≥ 14	≥ 12	≥ 10	≥ 8	≥ 6	< 6
		ONLY	YEAR	TEN	WAS	INVOLVED		IN	TRIALS	
10	453	15%	28%	38%	53%	67%	79%	88%	94%	6%

In general a student achieving a score of 16 out of 20 should be regarded as having mastered this skill.

Proper use of the scores:

This test is not designed to rank or grade students and its use for this purpose is highly undesirable. The scores obtained on this test will supply information about students who are having difficulty with the skill tested. For a more detailed analysis of these points, consult the manual which accompanies these tests.

Set scores:

Low scores on certain sets of questions may indicate specific problems as indicated below:

In Set 3, some students may encounter problems with "halved", "doubled", "tripled", or the use of "x½", "x2" etc.

In Sets 1 and 2 students may make arithmetic erros such as forgetting to use v^2, or using $(mv)^2$.

Related Tests

M18	Using Ohm's Law
M22	Using F = ma
M25	Manipulating questions

Related skills for which tests have not been prepared:

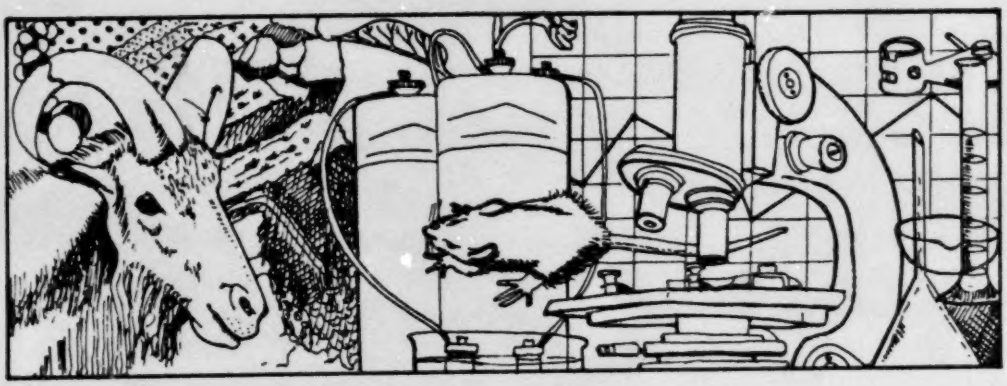
Performing arithmetical calculations.
Measuring kinetic energy.

M 22

New South Wales **Department of Education**

SCIENCE

MASTERY TESTING PROGRAMME



TEST M22 : A TEST FOR

THE SKILL OF

USING F=ma

This test is designed to measure your ability to make calculations using the "Newton's Law" equation

$$F = ma$$

where F = a force in newtons
m = a mass in kilograms
a = an acceleration in metres per second^2

In each question, choose the alternative which will complete the table. Mark its letter (A, B, C or D) on your answer sheet.

Question	Table: Force (in newtons)	Table: Mass (in kilograms)	Table: Acceleration (in metres per second^2)	A	B	C	D
SET 1							
1	0.1	0.1		0.01	0.1	1	10
2	1	1		0.1	1	2	10
3	1	10		0.1	1	10	20
4	10	1		10	11	100	1 000
5	10	10		0.1	1	10	100
SET 2							
6	0.1		1	0.01	0.1	1	10
7	1		1	1	2	10	100
8	10		10	0.01	0.1	1	10
9	100		10	0.01	0.1	1	10
10	10		100	0.1	1	10	1 000
SET 3							
11		0.1	0.1	0.01	0.1	1	10
12		0.1	1	0.001	0.01	0.1	1
13		1	10	0.01	0.1	1	10
14		10	1	0.01	0.1	1	10
15		10	10	0.1	1	100	1 000

SET 4

This set is designed to identify problems which you may have shown in the first three sets. In each question, use the equation given for that question to find the correct answer, and mark its letter (A, B, C or D) on your answer sheet.

Question	Given Equation	Find	ANSWERS			
			A	B	C	D
16	$x = 2y$	y	$2x$	x	$\frac{x}{2}$	x^2
17	$y = \frac{x}{z}$	x	yz	$\frac{z}{y}$	$\frac{y}{z}$	$y + z$
18	$y = \frac{x}{z}$	z	$\frac{x}{y}$	$\frac{y}{x}$	xy	$x + y$
19	$x = yz$	y	$\frac{z}{x}$	$\frac{x}{z}$	xz	$x + z$
20	$x = yz$	z	$\frac{x}{y}$	$\frac{y}{x}$	xy	$x + y$

TEACHERS' NOTES

This test is designed to determine whether or not the student can make calculations using the equation F = ma.

This test has been tested on a range of students in Year 10 New South Wales schools.

Recommended mastery score:

The final decision as to the score which indicates mastery must lie with the classroom teacher. The information below will help you to arrive at an informed decision. In this table you will find the percentages of students achieving a given score *or better*. Cumulative percentages are given for the two years in which the largest samples occur.

YEAR	NO. OF STUDENTS	S C O R E								
		≥20	≥19	≥18	≥17	≥16	≥15	≥14	≥13	<13
		ONLY	YEAR	TEN	WAS	INVOLVED		IN TRIALS		
10	481	29%	47%	58%	65%	73%	75%	79%	80%	20%

In general a student achieving a score of 16 out of 20 should be regarded as having mastered this skill.

Proper use of the scores:

This test is not designed to rank or grade students and its use for this purpose is highly undesirable. The scores obtained on this test will supply information about students who are having difficulty with the skill tested. For a more detailed analysis of these points, consult the manual which accompanies these tests.

Set scores:

Low scores on certain sets of questions may indicate specific problems as indicated below:

Set 1 Failure to manipulate equation correctly.

Set 2 Failure to manipulate equation correctly.

Set 3 Failure to manipulate equation correctly.

Set 4 These items are intended to identify particular difficulties in equation manipulation.

Related tests:

021046 Using Ohm's Law.

021064 Manipulating equations.

Calculating kinetic energy.

Related skills for which tests have not been prepared:

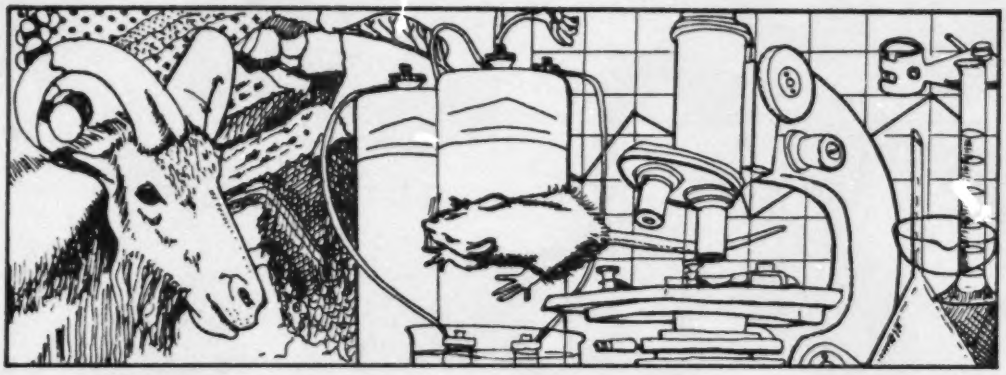
Division and multiplication with decimal numbers.

M 23

New South Wales **Department of Education**

SCIENCE

MASTERY TESTING PROGRAMME



TEST M23 : A TEST FOR

THE SKILL OF

USING A TABLE OF GEOLOGICAL PERIODS

This test is designed to test your ability to use the table of geological periods set out below.

Era	Period	Epoch	Length (millions of years)	Time from beginning to present (millions of years)
Cainozoic	Quaternary	Recent		
		Pleistocene	3	3
	Tertiary	Pliocene	9	12
		Miocene	13	25
		Oligocene	15	40
		Eocene	20	60
		Paleocene	10	70
Mesozoic	Cretaceous		65	135
	Jurassic		45	180
	Triassic		45	225
Palaeozoic	Permian		45	270
	Carboniferous		80	350
	Devonian		50	400
	Silurian		40	440
	Ordovician		60	500
	Cambrian		100	600
Precambrian			3 900	4 500

SET 1

In the next ten questions, a geological period is named, use the table to find the geological era in which it occurred and mark its letter (A, B, C or D) on your answer sheet.

Question	Period	A	B	C	D
1.	Cambrian	Cainozoic	Mesozoic	Palaeozoic	Precambrian
2.	Carboniferous	Cainozoic	Mesozoic	Palaeozoic	Precambrian
3.	Cretaceous	Cainozoic	Mesozoic	Palaeozoic	Precambrian
4.	Devonian	Cainozoic	Mesozoic	Palaeozoic	Precambrian
5.	Jurassic	Cainozoic	Mesozoic	Palaeozoic	Precambrian
6.	Ordovician	Cainozoic	Mesozoic	Palaeozoic	Precambrian
7.	Permian	Cainozoic	Mesozoic	Palaeozoic	Precambrian
8.	Quaternary	Cainozoic	Mesozoic	Palaeozoic	Precambrian
9.	Silurian	Cainozoic	Mesozoic	Palaeozoic	Precambrian
10.	Tertiary	Cainozoic	Mesozoic	Palaeozoic	Precambrian

SET 2

In the next five questions, a geological period is named. Use the table to find how long the period lasted. Find the letter (A, B, C or D) which matches your answer and mark it on your answer sheet.

Question		Answer in Millions of Years			
		A	B	C	D
11	Ordovician	60	440	500	560
12	Quaternary	0	3	6	9
13	Tertiary	9	12	67	70
14	Cretaceous	65	70	135	200
15	Cambrian	100	500	600	700

SET 3

In the next five questions, a geological period is named. Use the table to choose the correct description of <u>when</u> the period occurred. Mark its letter (A, B, C or D) on your answer sheet.

Question	Period	A	B	C	D
16	Devonian	before Permian before Cambrian	after Permian before Cambrian	before Permian after Cambrian	after Permian after Cambrian
17	Carboniferous	before Triassic before Permian	after Triassic before Permian	before Triassic after Permian	after Triassic after Permian
18	Cretaceous	before Jurassic before Devonian	before Jurassic after Devonian	after Jurassic before Devonian	after Jurassic after Devonian
19	Silurian	before Cretaceous before Cambrian	before Cretaceous after Cambrian	after Cretaceous before Cambrian	after Cretaceous after Cambrian
20	Ordovician	before Tertiary before Silurian	after Tertiary before Silurian	before Tertiary after Silurian	after Tertiary after Silurian

TEACHERS' NOTES

This test is designed to determine whether or not the student can use a table of geological periods.

This test has been tested on a range of students in Year 10 New South Wales schools.

Recommended mastery score:

The final decision as to the score which indicates mastery must lie with the classroom teacher. The information below will help you to arrive at an informed decision. In this table you will find the percentages of students achieving a given score *or better*. Cumulative percentages are given for the two years in which the largest samples occur.

YEAR	NO. OF STUDENTS	SCORE								
		≥20	≥18	≥16	≥14	≥13	≥12	≥11	≥10	<10
		ONLY	YEAR	TEN	WAS	INVOLVED		IN	TRIALS	
10	424	14%	36%	41%	78%	86%	89%	94%	97%	3%

In general a student achieving a score of 16 out of 20 should be regarded as having mastered this skill.

Proper use of the scores:

This test is not designed to rank or grade students and its use for this purpose is highly undesirable. The scores obtained on this test will supply information about students who are having difficulty with the skill tested. For a more detailed analysis of these points, consult the manual which accompanies these tests.

Set scores:

Low scores on certain sets of questions may indicate specific problems as indicated below:

Set 1 this set is aimed at the ability to extract basic information from a table. See also test 021001.

Set 2 this set is aimed at the ability to extract more complex information from a table.

Set 3 this set is carried over in a slightly revised form from test 021005. About 40% of average Year 10 students could be expected to answer each of these items.

Related tests:

021005 is replaced by this test.

Related skills for which tests have not been prepared:

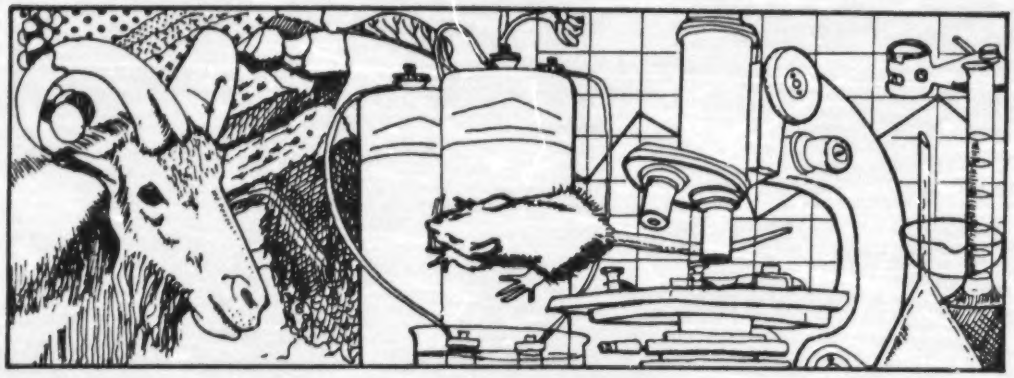
Constructing a table of geological periods from raw data.

M 24

New South Wales **Department of Education**

SCIENCE

MASTERY TESTING PROGRAMME



TEST M24 : A TEST FOR

THE SKILL OF

USING SCIENTIFIC NOTATION 2

This test is designed to test your ability to use scientific notation in a practical situation.

SET 1

For each question, a measurement is given in kilometres, together with four possible equivalents in metres. Choose the correct answer for each question and mark its letter (A, B, C or D) on your answer sheet.

Question	Measurement in kilometres	Possible answers expressed in metres			
		A	B	C	D
1	2	2×10^0	2×10^1	2×10^2	2×10^3
2	40	4×10^2	4×10^4	4×10^6	4×10^8
3	3.5	3.5×10^1	3.5×10^2	3.5×10^3	3.5×10^4
4	500	5×10^3	5×10^4	5×10^5	5×10^6
5	.1	1×10^0	1×10^1	1×10^2	1×10^3

SET 2

For each question, a measurement is given in kilometres, together with four possible equivalents in metres. Choose the correct answer for each question and mark its letter (A, B, C or D) on your answer sheet.

Question	Measurement in kilometres	Possible answers in metres			
		A	B	C	D
6	2×10^1	200	2 000	20 000	200 000
7	2.5×10^2	2 500	25 000	250 000	2 500 000
8	3×10^0	300	3 000	30 000	300 000
9	1.1×10^3	1 100	110 000	1 100 000	11 000 000
10	2.7×10^1	2 700	27 000	270 000	2 700 000

SET 3

For each question, a measurement is given in metres, together with four possible equivalents in kilometres. Choose the correct answer for each question and mark its letter (A, B, C or D) on your answer sheet.

Question	Measurement in metres	Possible answer given in kilometres			
		A	B	C	D
11	5 000	5×10^{0}	5×10^{1}	5×10^{2}	5×10^{3}
12	400	4×10^{0}	4×10^{-1}	4×10^{-2}	4×10^{-3}
13	35 000	3.5×10^{0}	3.5×10^{1}	3.5×10^{2}	3.5×10^{3}
14	6	6×10^{0}	6×10^{-1}	6×10^{-2}	6×10^{-3}
15	67	6.7×10^{0}	6.7×10^{-1}	6.7×10^{-2}	6.7×10^{-3}

SET 4

For each question, a measurement is given in metres, together with four possible equivalents in kilometres. Choose the correct answer for each question and mark its letter (A, B, C or D) on your answer sheet.

Question	Measurement in metres	Possible answer given in kilometres			
		A	B	C	D
16	3×10^{2}	0.3	3	30	300
17	6.6×10^{4}	0.66	6.6	66	660
18	1×10^{3}	0.1	1	10	100
19	4.5×10^{1}	0.045	0.45	4.5	45
20	8.6×10^{5}	0.86	8.6	86	860

TEACHERS' NOTES

This test is designed to determine whether or not the student can use scientific notation.

This test has been tested on a range of students in Year 10 in New South Wales schools. It is harder than most mastery tests.

Recommended mastery score:

The final decision as to the score which indicates mastery must lie with the classroom teacher. The information below will help you to arrive at an informed decision. In this table you will find the percentages of students achieving a given score *or better*. Cumulative percentages are given for the two years in which the largest samples occur. Some of the skills required are only taught by Mathematics teachers to Advanced level students.

YEAR	NO. OF STUDENTS	SCORE								
		⩾20	⩾18	⩾16	⩾14	⩾12	⩾10	⩾8	⩾6	<6
			ONLY	YEAR	10	WAS	INVOLVED	IN	TRIALS	
10	223	2%	6%	13%	26%	36%	45%	61%	75%	25%

In general a student achieving a score of 16 out of 20 should be regarded as having mastered this skill.

Proper use of the scores:

This test is not designed to rank or grade students and its use for this purpose is highly undesirable. The scores obtained on this test will supply information about students who are having difficulty with the skill tested. For a more detailed analysis of these points, consult the manual which accompanies these tests.

Set scores:

Low scores on certain sets of questions may indicate specific problems as indicated below:

Set 1 - Difficulty in manipulating figures in scientific notation. Lack of familiarity with metric system.

Set 2 - Difficulty in manipulating figures in scientific notation. Lack of familiarity with metric system.

Set 3 - Difficulty in manipulating figures in scientific notation. Lack of familiarity with metric system.

Set 4 - Difficulty in manipulating figures in scientific notation. Lack of familiarity with metric system.

Related tests:

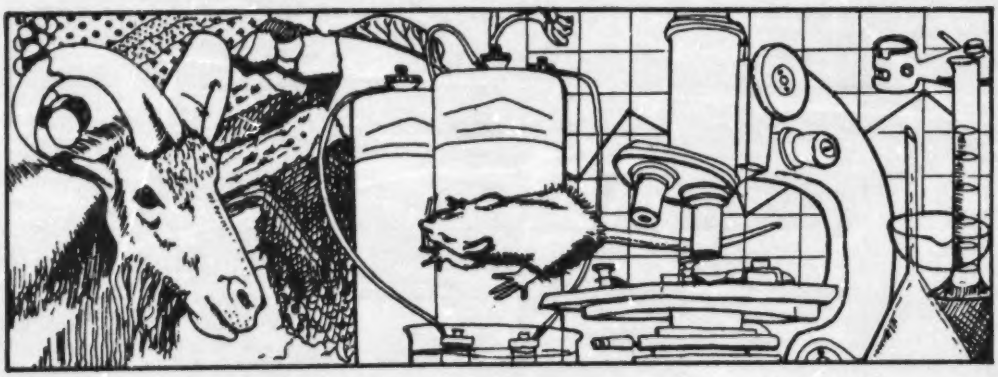
021015 - Converting metric length
021061 - Using scientific notation part 1
021064 - Dividing in scientific notation
Converting metric volume
Converting metric mass

M 25

New South Wales **Department of Education**

SCIENCE

MASTERY TESTING PROGRAMME



TEST M25 : A TEST FOR

THE SKILL OF

MANIPULATING EQUATIONS

The questions in this test are designed to test your ability to manipulate or rearrange equations that occur in science.

In the next 20 questions, equations are listed with four possible ways of rearranging each equation. Choose the correct rearrangement of the equation and mark its letter (A,B,C, or D) on your answer sheet.

QUESTION	EQUATION	REARRANGEMENT			
		A	B	C	D
1	$x = yz$	$z = xy$	$z = \frac{y}{x}$	$z = \frac{x}{y}$	$z = x + y$
2	$x = yz$	$y = \frac{z}{x}$	$y = xz$	$y = \frac{x}{z}$	$y = x + z$
3	$F = ma$	$a = Fm$	$a = F + m$	$a = \frac{m}{F}$	$a = \frac{F}{m}$
4	$F = ma$	$m = Fa$	$m = \frac{F}{a}$	$m = a + F$	$m = \frac{a}{F}$
5	$x = \frac{y}{z}$	$y = \frac{x}{z}$	$y = \frac{z}{x}$	$y = xz$	$y = x + z$
6	$x = \frac{y}{z}$	$z = xy$	$z = \frac{x}{y}$	$z = x + y$	$z = \frac{y}{x}$
7	$P = \frac{W}{t}$	$W = Pt$	$W = \frac{P}{t}$	$W = \frac{t}{P}$	$W = P + t$
8	$P = \frac{W}{t}$	$t = PW$	$t = \frac{W}{P}$	$t = P + W$	$t = \frac{P}{W}$
9	$x = y + az$	$y = x + az$	$y = az - x$	$y = x - az$	$y = az + x$
10	$x = y + az$	$z = \frac{x + y}{a}$	$z = \frac{y}{a} + \frac{x}{a}$	$z = \frac{x - y}{a}$	$z = x + ay$
11	$x = y + az$	$a = xz + y$	$a = \frac{x}{z} + \frac{y}{z}$	$a = \frac{y}{z} + x$	$a = \frac{x - y}{z}$
12	$v = u + at$	$u = v - at$	$u = v + at$	$u = a + vt$	$u = av + t$
13	$v = u + at$	$a = \frac{v + u}{t}$	$a = \frac{v - u}{t}$	$a = \frac{u - v}{t}$	$a = u + vt$
14	$v = u + at$	$t = v + au$	$t = v - ua$	$t = \frac{v}{a} + \frac{u}{a}$	$t = \frac{v - u}{a}$
15	$x = \frac{1}{2} yz^2$	$y = \frac{2x}{z^2}$	$y = \frac{z^2}{2x}$	$y = \frac{x}{2z^2}$	$y = \frac{2z^2}{x}$

QUESTION	EQUATION	REARRANGEMENT			
		A	B	C	D
16	$x = \frac{1}{2} yz^2$	$z^2 = \frac{y}{2x}$	$z^2 = \frac{2x}{y}$	$z^2 = \frac{2y}{x}$	$z^2 = \frac{x}{2y}$
17	$K = \frac{1}{2} mv^2$	$v^2 = \frac{K}{2m}$	$v^2 = \frac{2m}{K}$	$v^2 = \frac{2K}{m}$	$v^2 = \frac{m}{2K}$
18	$K = \frac{1}{2} mv^2$	$m = \frac{2v^2}{K}$	$m = \frac{K}{2v^2}$	$m = \frac{v^2}{2K}$	$m = \frac{2K}{v^2}$
19	$g = \frac{S}{2t^2}$	$S = 2gt^2$	$S = \frac{2g}{t^2}$	$S = \frac{t^2}{2g}$	$S = \frac{2t^2}{g}$
20	$g = \frac{S}{2t^2}$	$t^2 = \frac{2S}{g}$	$t^2 = \frac{g}{2S}$	$t^2 = \frac{2g}{S}$	$t^2 = \frac{S}{2g}$

TEACHERS' NOTES

This test is designed to determine whether or not the student can manipulate or rearrange equations.

This test has been tested on a range of students in Year 10 in New South Wales schools.

Recommended mastery score:

The final decision as to the score which indicates mastery must lie with the classroom teacher. The information below will help you to arrive at an informed decision. In this table you will find the percentages of students achieving a given score *or better*. Cumulative percentages are given for the two years in which the largest samples occur.

YEAR	NO. OF STUDENTS	S C O R E								
		⩾20	⩾18	⩾16	⩾14	⩾12	⩾10	⩾8	⩾6	<6
		ONLY	YEAR	TEN	WAS	INVOLVED	IN	TRIALS		
10	480	14%	19%	38%	51%	63%	75%	86%	93%	7%

In general a student achieving a score of 16 out of 20 should be regarded as having mastered this skill.

Proper use of the scores:

This test is not designed to rank or grade students and its use for this purpose is highly undesirable. The scores obtained on this test will supply information about students who are having difficulty with the skill tested. For a more detailed analysis of these points, consult the manual which accompanies these tests.

Set scores:

Low scores on certain sets of questions may indicate specific problems as indicated below:

Difficulties in manipulating equations.

This test is designed to identify specific problems which may affect performance on other mastery tests. It will be noted that "x, y, z" equations are mixed in with common scientific formulae which have the same form of expression.

A student who has mastered this skill could be expected to perform well in

M18 Using Ohm's Law
M21 Calculating kinetic energy
M22 Using F = ma

Related tests:

021061 Using scientific notation 1
M24 Using scientific notation 2
021065 Dividing in scientific notation

Related skills for which tests have not been prepared:

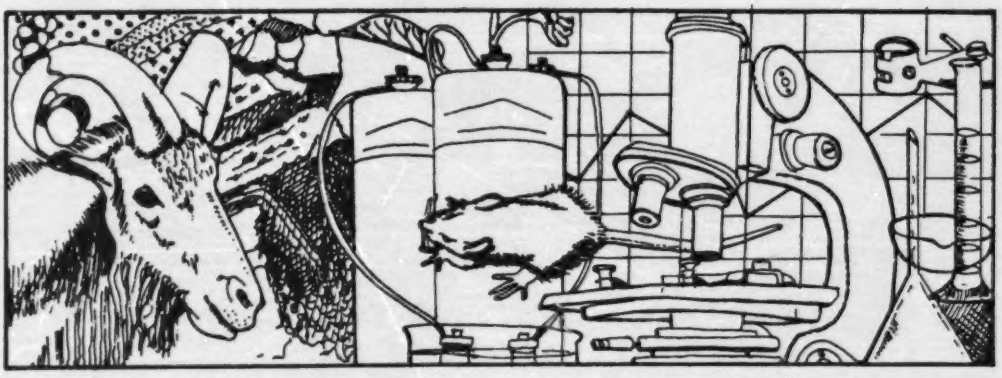
Basic skills in arithmetic.

M 26

New South Wales **Department of Education**

SCIENCE

MASTERY TESTING PROGRAMME



TEST M26 : A TEST FOR

THE SKILL OF

UNDERTAKING EXPERIMENTAL DESIGN

This test is designed to measure your ability to analyse a design for an experiment.

Set 1 A student saw a T.V. advertisement for a new washing powder "Gusho". The advertisement claimed the Gusho gets whites "whiter" in cold water than brand X does in cold water. Two students decided to test this claim by carrying out an experiment. They took 3 sheets and washed them in a washing machine as follows:

(i) sheet 1 in cold water and brand 'X'
(ii) sheet 2 in cold water and Gusho
(iii) sheet 3 in cold water only.

After drying and comparing the sheets they found that there was no difference in the whiteness of the 3 sheets.

For each of the next five questions, choose the *best* answer and mark its letter (A, B, C or D) on your answer sheet.

QUESTION	STATEMENT	POSSIBLE ANSWERS			
		A	B	C	D
1	The control(s) is (are):-	wash (i)	wash (ii)	wash (iii)	wash (i) & (ii)
2	The experiment could be improved by:-	using more Gusho	carrying out experiment in hot & cold water	doing the experiment three times	using the same sheet in each wash
3	In the 3 washes one thing that would NOT have to be controlled is:-	the amount of soap powder used	the size of the washing machine	the amount of water	the time of each wash
4	The experiment shows that:-	Gusho washes better	brand "X" washes better	Gusho & brand "X" wash equally well	Gusho, brand "X" & water wash just as well as each other
5	From this experiment the students could conclude that the claim was:-	true	partly true	not supported	false

Set 2 Some students read in a book that boys can run faster than girls. They asked some of their friends to race against each other on the school oval during their lunchtime. The results were:-

(i) Jill beat Tom over 100 metres
(ii) Rod beat Sally over 200 metres
(iii) Ruth beat Bill over 400 metres

The students decided that their results showed that the statement in the book was wrong.

For each of the next five questions, choose the *best* answer and mark its letter (A, B, C or D) on your answer sheet.

QUESTION	STATEMENT	POSSIBLE ANSWERS			
		A	B	C	D
6	The statement in the book is clear about	the ages of the boys & girls	the distances to be run	how many students were tested	which sex runs faster
7	Which factor does not need to be controlled?	distances run	prior training	age & size of competitors	number of races held
8	The experiment would be improved by:-	checking the statement by reading other books	have more competitors in each race	race boys against boys, girls against girls	conducting a survey of student opinion
9	The experiment's results show us that:-	girls always beat boys	girls do more training than boys	boys sometimes beat girls	Ruth is the fastest runner
10	From the results of this experiment, the students could conclude that the statement in the book:-	probably false	definitely false	probably true	definitely true

TEACHERS' NOTES

This test is designed to determine whether or not the student can analyse an experimental design.

This test has been tested on a range of students in Year 10 in New South Wales schools.

Recommended mastery score:

The final decision as to the score which indicates mastery must lie with the classroom teacher. The information below will help you to arrive at an informed decision. In this table you will find the percentages of students achieving a given score *or better*. Cumulative percentages are given for the two years in which the largest samples occur.

YEAR	NO. OF STUDENTS	S C O R E								
		≥ 10	≥ 9	≥ 8	≥ 7	≥ 6	≥ 5	≥ 4	≥ 3	<3
		ONLY	YEAR	10	WAS	INVOLVED	IN	TRIALS		
10	431	2%	10%	31%	50%	71%	84%	93%	97%	3%

In general a student achieving a score of 8 out of 10 should be regarded as having mastered this skill.

Proper use of the scores:

This test is not designed to rank or grade students and its use for this purpose is highly undesirable. The scores obtained on this test will supply information about students who are having difficulty with the skill tested. For a more detailed analysis of these points, consult the manual which accompanies these tests.

Set scores:

Low scores on certain sets of questions may indicate specific problems as indicated below:

Questions 1, 2, 3, 7, 8 - ability to design experimental procedure, in particular, method.

Questions 4, 9 - ability to state results of experiment.

Questions 5, 10 - ability to draw conclusions from experiments.

Question 6 - ability to recognise the hypothesis.

Related tests:

M15 - Identifying parts of the scientific method.

Related skills for which tests have not been prepared:

Designing experiments in different scientific areas.
Selecting suitable apparatus.
Performing experiments.